REMARKS/ARGUMENTS

Favorable reconsideration of this application, in light of the present amendments and following discussion, is respectfully requested.

Claims 1-3, 5, 6, 12, 13, 16, 18-20, 23-47, 49, and 52 are pending. Claims 1, 24, 29, 47, and 49 are amended. Claim 52 is newly added. Claims 21-22, 48, and 50-51 were canceled previously. Claims 38-46 are withdrawn. Support for the amendments to Claim 1 can be found in the published application in numbered paragraph [0024], for example. Support for the amendments to Claims 24, 29, 47, and 49 can be found in numbered paragraph [0043], for example. Support for newly added Claim 52 can be found in numbered paragraph [0041], for example. No new matter is added.

In the outstanding Office Action, Claims 24, 29, 47, and 49 were rejected under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement. Claims 24, 29, 47, and 49 were rejected under 35 U.S.C. § 112, second paragraph, as indefinite. Claims 1, 2, 12, 16, 23, 24, 27, 31-33, 47, and 49 were rejected under 35 U.S.C. § 102(e) as anticipated by Nagaoka et al. (U.S. Patent Pub. 2003/0113971 herein "Nagaoka"). Claims 1-3, 5-6, 12, 13, 16, 18-20, 23-27, 47, and 49 were rejected under 35 U.S.C. § 103(a) as obvious over Vatus et al. (U.S. Patent Pub. 2004/0175893, herein "Vatus") in view of Singh et al. (U.S. Patent Pub. 2007/0240632 herein "Singh").

At the outset, Applicants note with appreciation the courtesy of a personal interview granted by Primary Examiner Tuan Nguyen to Applicants' representative. In combination with the Interview Summary provided by Examiner Nguyen, the substance of the personal interview is summarized below in accordance with MPEP § 713.04.

Regarding the rejection of Claims 24, 29, 47, and 49 as failing to comply with the written description requirement, that rejection is respectfully traversed by the present response.

Amended dependent Claim 24 recites:

> The method according to claim 23, wherein the depositing comprises selectively depositing, relative to a mask, a SiGe-containing epitaxial film on a silicon surface.

Accordingly, the method includes selectively depositing, relative to a mask, a silicon-germanium containing epitaxial film on a silicon surface. The specification states:

> In one embodiment of the invention, the inventors have discovered a method to selectively deposit an epitaxial silicon-containing film on substrate using a HCD process gas in a process chamber of a batch type processing system. Selective epitaxial deposition of a silicon-containing film was observed on surface areas containing silicon, and **no** or little silicon deposition was observed on other surface areas containing, for example, oxides (e.g., an oxide photomask) or nitrides (e.g., a SiN layer). The inventors speculate that the higher silicon deposition rate that is observed using a HCD process gas compared to when using the conventional DCS process gas, results in the epitaxial deposition of a silicon-containing film to be more selective. In general, deposition selectivity with respect to deposition onto different substrate materials can be achieved when the nucleation time (incubation time) for the silicon-containing film deposition differs enough for one substrate material compared to another substrate material. In practice, if the deposition rate of a silicon-containing film is high enough and the incubation time difference is large enough for different materials, a silicon-containing film can be grown on the material with the shorter incubation time (e.g., silicon) **before deposition starts on other materials with longer incubation times** (e.g., oxides or nitrides). As a result, a thicker epitaxial silicon-containing film can be grown on clean silicon substrate using HCD process gas before deposition starts in other areas on the substrate.[1] (Emphasis added)

Accordingly, the specification describes that **no** silicon was observed on other surface areas containing, for example oxides (e.g., an oxide photo mask). As discussed during the personal interview, although the above-noted section of the specification states that little silicon deposition was observed in one example, the above-noted section also states that "no" silicon was observed on other surface areas in another example. Accordingly, Applicants

[1] Published Application, numbered paragraph [0043].

respectfully submit that the specification supports the feature of "selectively depositing" recited in amended dependent Claim 24 and Claims 29, 47, and 49, which recite substantially similar features.

Additionally, Applicants note that, for example in number paragraph [0043] of the published application and in various other places within the specification, the term "selectively" is used to describe depositing as recited in the above-noted claims. Applicants respectfully submit that the mere indication that in some instances "little silicon" will be deposited does not nullify the description in other parts of the specification of "selectively" depositing epitaxial films. Accordingly, Applicants respectfully submit that the rejection of Claims 24, 29, 47, and 49 as failing to comply with the written description requirement is overcome.

Regarding the rejection of Claims 24, 29, 47, and 49 as indefinite, that rejection is respectfully traversed by the present response.

As discussed during the personal interview, Claims 24, 29, 47, and 49 are amended to recite that the selective deposition occurs "relative to a mask." Thus, as discussed during the personal interview, two different areas on the substrate are described. One area receives the deposited layer and another area, the mask, does not receive the same deposition as the first area. Accordingly, Applicants respectfully submit that, as discussed during the personal interview, the amendments to Claims 24, 29, 47, and 49 further clarify the "selectively depositing" feature recited in Claims 24, 29, 47, and 49, and the rejection of these claims as indefinite is overcome.

Regarding the rejection of Claims 1, 2, 12, 16, 23, 24, 27, 31-33, 47, and 49 as anticipated by Nagaoka, that rejection is respectfully traversed by the present response.

Amended independent Claim 1 recites, in part:

> depositing a silicon-containing epitaxial film on the crystalline substrate using the process gas,
> wherein the process gas consists of HCD gas or HCD gas and at least one gas from the group consisting of a dopant gas, H_2, a germanium-containing gas, and an inert gas.

Accordingly, the depositing deposits a silicon-containing epitaxial film on a **crystalline** substrate.

In contrast, Nagaoka provides a method of manufacturing a semiconductor device by depositing a conductive layer via CVD on an insulating layer of oxide film[2] Nagaoka states:

> The present invention is proposed in view of the above-mentioned problems. Accordingly, the present invention provides a manufacturing method of manufacturing a semiconductor device, which **while forming a conductive layer on an oxide film formed as an insulating layer** by using the CVD method, protects the oxygen deficiency of the oxide film without any drop in the dielectric breakdown resistance as the insulating layer of the oxide film and without any reduction in the long-term reliability.[3]

Accordingly, as discussed during the personal interview, Nagaoka deposits its layer on an oxide film used as an insulator. As further discussed during the personal interview, an oxide film used as an insulator is an **amorphous** film, not a crystalline substrate as recited in amended independent Claim 1. Accordingly, Applicants respectfully submit that amended independent Claim 1 patentably distinguishes over Nagaoka for at least the reasons discussed above.

Amended independent Claims 47 and 49 each recite that the depositing deposits, selectively, an epitaxial film on a **crystalline** substrate. Accordingly, Applicants respectfully submit that amended independent Claims 47 and 49 each patentably distinguish over Nagaoka for at least the same reasons as amended independent Claim 1 does.

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[2] Nagaoka, Abstract.
[3] Nagaoka, numbered paragraph [0015] (emphasis added).

Claims 2, 12, 16, 23, 24, 27, and 31-33 each depend, directly or indirectly from amended independent Claim 1 and patentably distinguish over Nagaoka for at least the same reasons as amended independent Claim 1 does.

Regarding the rejection of Claims 1-3, 5-6, 12, 13, 16, 18-20, 23-37, 47, and 49 as obvious over Vatus in view of Singh, that rejection is respectfully traversed by the present response.

Amended independent Claim 1 recites, in part,

> depositing a silicon-containing epitaxial film on the crystalline substrate using the process gas,
> wherein the process gas consists of HCD gas or HCD gas and at least one gas from the group consisting of a dopant gas, H_2, a germanium-containing gas, and an inert gas.

Accordingly, the process gas **consists** of HCD gas or HCD gas and at least one gas from a group consisting of a dopant gas, a germanium-containing gas, and an inert gas.

As discussed in the previous response, and acknowledged in the outstanding Office Action, Vatus fails to teach the use of a process gas consisting of HCD gas or HCD gas and at least one gas from a group consisting of a dopant gas, H_2, a germanium-containing gas, and an inert gas. Rather, as discussed in the previous response, Vatus uses an epitaxial film forming process gas that includes a silicon source gas and a **chlorine** gas. Vatus states:

> At operation 708, an epitaxial silicon film forming process gas and a carrier gas are introduced into a reactor chamber. In one embodiment, the epitaxial silicon film forming process gas and the carrier gas have a flow ratio between 1:1 and 1:200. In another embodiment, the epitaxial silicon film forming process gas and the carrier gas have a flow ratio between 1:10 and 1:90. In one embodiment, the epitaxial film forming process gas includes at least a silicon source gas and a chlorine source gas (e.g., HCl), which enable the deposition of an epitaxial silicon film.[4]

[4] Vatus, numbered paragraph [0050].

As discussed during the personal interview, while Vatus uses the terminology "in one embodiment" to describe the recipe in which its epitaxial film is formed, Vatus uses the "in one embodiment" language in front of every embodiment, and **none of the embodiments described in Vatus excludes a chlorine source gas**. Rather, Vatus derives a specific benefit from the use of chlorine gas because the chlorine gas provides, as stated in Vatus, a smoother film surface[5] Thus, as discussed during the personal interview, a person of ordinary skill in the art would not understand Vatus to permit applying an epitaxial film with HCD gas while omitting the inclusion of a chlorine gas. In other words, Vatus teaches away from applying HCD without a chlorine gas.

Additionally, as further discussed during the personal interview, Singh does not describe the use of HCD gas in applying its film, and in fact teaches away from the use of HCD gas. Singh notes, in numbered paragraph [0007], that HCD gas is used in film deposition processes. Singh states, in numbered paragraph [0008], "supplemental etchants are generally halogenated and/or radical compounds (e.g., HCl or Cl) that necessitate high reactivity. Therefore, hazardous and toxic conditions are often associated with etchant use." In numbered paragraph [0009], Singh states "therefore, there is a need to provide silicon-containing compounds that provide both a source chemical for silicon deposition and a source chemical as an etchant." Thus, Singh, in reference to HCD gas, recognizes a problem inasmuch as Singh interprets the use of HCD gas to require the use of supplemental etchants that are hazardous and toxic. Singh solves the problems it recognizes regarding the use of HCD gas (for example, as used in Vatus) by providing hundreds of possible substitutes for HCD gas.

[5] Vatus, numbered paragraph [0040].

Additionally, Singh states:

> Chlorine and hydrogen incorporation into silicon films has plagued the prior art by the use of lower silanes, lower halosilanes or hexachlorodisilane.[6]

Accordingly, as discussed during the personal interview, Singh describes the use of HCD gas as "plagued" by chlorine and hydrogen incorporation into silicon films. In other words, Singh strongly teaches away from the use of HCD gas because Singh understands HCD gas to require the use of chlorine gas in addition to the HCD gas. Accordingly, Applicants respectfully submit that no proper combination of Vatus and Singh would include all the features recited in amended independent Claim 1 inasmuch as Singh recognizes the problem provided by the process described in Vatus and **solves this problem by using a compound other than HCD gas**. In other words, a person of ordinary skill in the art reading Vatus in combination with Singh would understand Singh to require the removal of HCD gas from the process, not just the removal of chlorine gas. This is so because Singh solves the problem it recognizes in Vatus by replacing HCD and chlorine with one of the hundreds of other compounds listed in the detailed description provided by Singh. Accordingly, Applicants respectfully submit that amended independent Claim 1 and the claims depending therefrom patentably distinguish over any proper combination of Vatus and Singh for at least the reasons discussed above.

Independent Claims 47 and 49 each recite substantially similar features to those discussed above regarding amended independent Claim 1 and patentably distinguish over any reasonable combination of Vatus and Singh for at least the same reasons as amended independent Claim 1 does.

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[6] Singh, [0046].

Newly added dependent Claim 52 depends from amended independent Claim 1 and patentably distinguishes over any proper combination of the cited references for at least the same reasons.

Consequently, in light of the above discussion and in view of the present amendment, the present application is believed to be in condition for allowance. An early and favorable action to that effect is respectfully requested.

Respectfully submitted,

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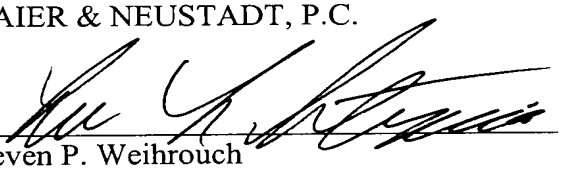

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